

**DEPARTMENT OF ENVIRONMENTAL QUALITY
PERMITTING and COMPLIANCE DIVISION
MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM
(MPDES)**

Statement of Basis

PERMITTEE: City of East Helena

PERMIT NUMBER: MT0022560

RECEIVING WATER: Prickly Pear Creek

FACILITY INFORMATION:

Name: City of East Helena Wastewater Treatment Plant

Location: 3330 Plant Road
East Helena, MT 59635

Contact: Bill Casey, Public Works Director
P.O. Box 1170
East Helena, MT 59635
(406) 459-1816

FEE INFORMATION:

Number of Outfalls: 1 (for fee determination purposes)

Type of Outfall: 001 – Minor Publicly-Owned Treatment Works (POTW),
aerated, activated sludge mechanical with continuous discharge
to surface water

I. Permit Status

The current Montana Pollutant Discharge Elimination System (MPDES) permit for the East Helena Wastewater Treatment Plant (WWTP) was issued on April 15, 1997 and became effective on May 1, 1997. It expired at midnight, March 30, 2002. In August of 2001, the permittee submitted an application and the associated fees for the renewal of the MPDES permit using MT short form 2A. In accordance with ARM 17.30.1313, the permit was administratively extended at that time. The permittee constructed a new treatment facility in 2003 and brought it on line in August of that year. In December 2004, the permittee submitted EPA Form 2A with updated information regarding the WWTP.

II. Facility Information

A. Facility Description

The East Helena WWTP serves some of the residents and businesses of the City of East Helena and select areas of Lewis and Clark County, with service to an estimated population of 1,673 (2004 renewal application). The current WWTP is an aerated, activated sludge, Bio-Lac treatment system. The previous permit allowed for discharge to Prickly Pear Creek via Outfall 001. The present facility design flow is 0.434 million gallons per day (mgd) which is a reduction in design flow from the originally permitted 0.635 mgd. Minimum detention time is 16.2 hours (Robert Peccia & Associates 1986 and HDR Engineering, Inc. 2002 Operation and Maintenance Manuals). The effluent is disinfected seasonally (April through October) using ultra-violet (UV) light.

Effluent flow monitoring occurs prior to the UV disinfection system (See Attachment A). Irrigation and plant non-potable water are drawn off after the final effluent flow monitoring point. The permittee indicated that an average of 0.054 mgd of effluent is used for irrigation on the approximate 4-acre POTW property from May through October. Table 1 is a summary of the East Helena WWTP design criteria from the Robert Peccia & Associates 1986 and the HDR Engineering, Inc. 2002 Operation and Maintenance Manuals.

Table 1. Current Design Criteria Summary – East Helena WWTP

Facility Description: Continuous discharge, mechanical, Bio-Lac activated sludge system with UV disinfection and aerobic sludge storage.	
Construction Date: 2002	Modification Date: NA
Design Year: 2021	
Design Population: 3,578	Population Served: ~2,000
Design Flow, Average (mgd): 0.434	Design Flow, Peak (mgd): 1.48
Minimum Detention Time (Activated Sludge System): 16.2 hours	
Design BOD Removal (%): 94	Design Load (lb/day): 576 lb/day
Design SS Removal (%): 91	Design Load (lb/day): 608 lb/day (192 mg/L)
Collection System: Combined [] Separate [X] no constructed combined sewer outfalls	
SSO Events (Y/N): yes	Number: one
Bypass Events: none reported	Number: NA
Inflow and Infiltration contribution (mgd): 0.010	Source: Inflow from curbs and gutters during run-off events
Disinfection: Yes	Type: UV
Discharge Method: Continuous	
Effluent Flow Primary Device: v-notch weir and staff gauge installed prior to plant non-potable water and irrigation draw off points.	
Effluent Secondary Flow Device: TN Tech Ultrasonic meter	
Sludge Storage: aerobic digester/stabilization	
Sludge Disposal: unknown	Authorization Number: MTG650056

In the previous permit cycle, the East Helena POTW was required to establish an industrial pretreatment program due to the type of industries utilizing the treatment system (ASARCO and American Chemet). Since permit issuance in 1997, the City reports both Significant Industrial Users (SIU) have ceased discharge of process wastewater to the WWTP, however this has not been corroborated by the Department. To date, the pretreatment program has not been implemented.

The collections system serves approximately 700 connections. Originally built in 1955, there are over 10 miles of sewer and three city-owned lift stations. Inflow and Infiltration (I/I) are estimated to be 0.010 mgd during run-off events (Renewal Application, 2004). The 2007 Compliance Evaluation Inspection Report of May 14, 2007 identified at least eight curb and gutter inlets to the collection system.

In February 2008, the permittee obtained authorization MTG650056 under the United States Environmental Protection Agency (EPA) Region VIII Permit Number MTG650000, General Permit for Facilities/Operations that Generate, Treat, and/or Use/Dispose of Sewage Sludge by Means of Land Application, Landfill, and Surface Disposal Under the National Pollutant Discharge Elimination System.

B. Effluent Characteristics

Corrected effluent data from the facility Discharge Monitoring Reports (DMR) for the Period of Record (POR) August 2003 through November 2007 are summarized in Table 2. This POR covers the period after the facility upgrade to the new treatment system.

Table 2. DMR Effluent Characteristics for POR August 2003 through November 2007

Parameter	Location	Units	Previous Permit Limit	Minimum Value	Maximum Value	Average Value	Number of Samples
Flow, Daily Average	Effluent	mgd	(1)	0.108	0.665	0.251	52
Biochemical Oxygen Demand (BOD ₅)	Influent	mg/L	(2)	-	-	-	0
	Effluent	mg/L	45/30 ⁽³⁾	1	20	5.1	50
	Effluent	% removal	85 ⁽⁴⁾	-	-	-	0
	Effluent	lb/day	158 ⁽⁵⁾	1.1	29	9.5	52
Total Suspended Solids (TSS)	Influent	mg/L	(2)	-	-	-	0
	Effluent	mg/L	135/100 ⁽³⁾	1	48	11.8	52
	Effluent	% removal	85 ⁽⁴⁾	-	-	-	0
	Effluent	lb/day	526 ⁽⁵⁾				
Fecal Coliform Bacteria ⁽⁶⁾	Effluent	Number per 100 mL	10,000 / 5,000 ⁽⁷⁾	2.7	75	23.8	52
pH (median value)	Effluent	s.u.	6.0-9.0	5.23	8.27	6.63	50
Temperature	Effluent	°C	(2)	-	-	-	0
Total Residual Chlorine	Effluent	mg/L	0.05 ^(4, 8)	-	-	-	0
Total Ammonia as N	Effluent	mg/L	(1)	<0.10	15.5	0.98	52
Total Kjeldahl Nitrogen	Effluent	mg/L	(1)	0.70	17.8	3.4	52
Nitrate + Nitrite as N	Effluent	mg/L	(1)	1.1	31.9	16.1	52
Total Nitrogen (TN) ⁽⁹⁾	Effluent	mg/L	(1)	3.0	36.2	19.4	52
		lb/day	80 ⁽⁵⁾	13	67.5	35.7	52
Total Phosphorus as P (TP)	Effluent	mg/L	(1)	1.5	7.3	3.8	52
		lb/day	20 ⁽⁵⁾	2.1	15.0	7.3	52
Dissolved Oxygen	Effluent	mg/L	-	-	-	-	0
Copper, Total Recoverable	Effluent	mg/L	(10)	<0.01	0.12	0.026	48
Lead, Total Recoverable	Effluent	mg/L	(10)	<0.01	0.05	0.013	48
Zinc, Total Recoverable	Effluent	mg/L	(10)	<0.01	0.17	0.054	48
Oil and Grease	Effluent	mg/L	(2)	-	-	-	0
Total Dissolved Solids	Effluent	mg/L	(2)	-	-	-	0

Footnotes:

- (1) No effluent limit in previous permit, monitoring requirement only.
- (2) No limit or monitoring requirement in previous permit
- (3) Weekly Average Value/Monthly Average Value.
- (4) Effluent limit but no monitoring required in previous permit.
- (5) Nondegradation value, not permit load limit.
- (6) Sample period is April 1 through October 31.
- (7) Weekly Geometric Mean Value/Monthly Geometric Mean Value.
- (8) Instantaneous/Daily Maximum Value.
- (9) Calculated as the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.
- (10) Narrative Limitations: no acute toxicity or ≤ instream concentrations when instream concentrations exceed standards.

C. Compliance History

Review of the DMRs shows that the permittee failed to calculate and report facility loading correctly for 5-Day Biochemical Oxygen Demand (BOD₅) (27 erroneous values out of 52 samples), Total Suspended Solids (TSS) (29/52), Total Nitrogen (15/52), and Total Phosphorus as P (28/52) over the POR (see Section IV.E.3. of this Statement of Basis). Total recoverable metals concentrations exceeded instream standards throughout the POR. Effluent pH was reported to be lower than the limit of 6.0 s.u. four times over the POR.

There are no records in the Department administrative file for the facility indicating that the pretreatment program was implemented as outlined in Part III. I. “Industrial Pretreatment Program” of the 1997 permit. The permit-required reports regarding the pretreatment program were not available. The current status of the pretreatment program is not established.

The May 14, 2007 Compliance Evaluation Inspection Report identified the need for the permittee to pursue coverage under EPA Region VIII Permit Number MTG-650000 prior to the disposal of sewage sludge/biosolids. The permittee verified that authorization number MTG650056 was received in February 2008 (Permittee Compliance Inspection Response, April 2, 2008).

Compliance inspections have noted the permittee’s failure to: 1) maintain records contents as required by permit; 2) monitor flow within 10 percent of the actual flow being measured as the facility draws non-potable plant water and irrigation water from the effluent line after the final effluent flow meter; and, 3) utilize and adhere to 40 CFR 136-accepted laboratory methods.

III. Proposed Technology-based Effluent Limits (TBELs)

A. Applicability

The Board of Environmental Review has adopted by reference 40 CFR 133 which set minimum treatment requirements for secondary treatment or equivalent for POTW (ARM 17.30.1209). Secondary treatment is defined in terms of effluent quality as measured by BOD₅, TSS, percent removal of BOD₅ and TSS, and pH [National Secondary Standards (NSS)]. National secondary treatment requirements are described in 40 CFR 133 and incorporated into all municipal permits.

The regulations in 40 CFR 133.105 allow for the application of treatment equivalent-to-secondary effluent limitations (TES) or Alternative State Requirements for TSS (ASR) to facilities that meet specific criteria. To qualify for TES, the facility must use either a trickling filter or waste stabilization pond as the principle process of treatment as stated in 40 CFR 133.101(g)(2). The previous East Helena MPDES permit was developed for a lagoon treatment system. Technology-based effluent limits established in the previous permit cycle reflected the use of NSS for BOD₅, BOD₅ removal efficiency, and pH and the application of ASR for TSS [100 milligrams per liter (mg/L) for the 30-day average limit and 135 mg/L TSS as a 7-day limitation with no percent removal requirement].

Because the upgraded facility is an activated sludge mechanical treatment plant, NSS must be applied to the discharge. Therefore, NSS limitations for BOD₅, BOD₅ percent removal, and pH will be maintained in this permit renewal. The TSS limitation will be reduced to the NSS limits of 30 mg/L for a 30-day average and 45 mg/L for the 7-day average with a percent removal requirement of 85 percent.

ARM 17.30.1345(8) requires that all effluent limits be expressed in terms of mass except for pollutants which cannot be appropriately expressed in terms of mass. The previous mass-based limitations utilized the design flow of 0.635 mgd. Because the new facility average design flow is 0.434 mgd versus the original design flow of 0.635, it is necessary to recalculate the mass-based load limits.

The following equation was used to calculate mass-based loading limits in pounds per day (lb/day) using NSS limitations at the upgraded new design flow of 0.434 mgd.

$$\text{Load (lb/day)} = \text{Design Flow} \times \text{Concentration Limit (mg/L)} \times 8.34 \text{ (lb}\cdot\text{L)/(mg}\cdot\text{gal)}$$

BOD₅ and TSS Mass-based Load Limits at Upgraded Flow:

$$30\text{-day average load (lb/day)} = (0.434 \text{ mgd})(30 \text{ mg/L})(8.34) = 109 \text{ lb/day}$$

$$7\text{-day average load (lb/day)} = (0.434 \text{ mgd})(45 \text{ mg/L})(8.34) = 163 \text{ lb/day}$$

Loading limits for technology-based parameters of concern (BOD₅ and TSS) will apply to the effluent and will be maintained at the more stringent of the nondegradation allocations or mass-based loading limits calculated in this Statement of Basis.

B. Nondegradation Load Allocations

The provisions of ARM 17.30.701 - 718 (Nondegradation of Water Quality) apply to new or increased sources of pollution [ARM 17.30.702(18)]. Sources that are in compliance with the conditions of their permit and do not exceed the limits established in the permit or determined from a permit previously issued by the Department are not considered new or increased sources.

Nondegradation threshold values for the East Helena WWTP were calculated for BOD₅, TSS, Total Nitrogen as N (TN), and Total Phosphorus (TP) as part of the renewal of the permit in 1997 for the lagoon facility with a design flow of 0.635 mgd. The nondegradation load allocations and the actual average loads discharged from the facility for the POR are presented below in Table 3. Actual loads for BOD₅, TSS, TN, and TP were obtained from the facility DMRs. These data indicate that the facility did not exceed the nondegradation load values calculated for BOD₅, TSS, TN and TP.

Table 3. Nondegradation and Actual Loads for POR

		Nondegradation Allocated Load	Actual 30-Day Annual Average Load				
Parameter	Units	30-Day Annual Average Load	2003	2004	2005	2006	2007
BOD ₅	lb/day	158	14.5	6.9	11.4	9.5	7.9
TSS	lb/day	526	30	18.3	29.4	22.9	21.9
Total Nitrogen	lb/day	80	44.5	31.9	39.4	30.1	38.2
Total Phosphorus as P	lb/day	20	5.8	5	9	7.7	8.2

C. Proposed TBELS

Table 4. Outfall 001 Proposed TBELS

Parameter	Concentration (mg/L)		Load (lb/day)	
	Weekly Average ⁽¹⁾	Monthly Average ⁽¹⁾	Weekly Average ⁽¹⁾	Monthly Average ⁽¹⁾
BOD ₅	45	30	163	109
TSS	45	30	163	109
pH, s.u	Within the range of 6.0 to 9.0 (instantaneous)			
BOD ₅ Percent Removal ¹ (%)	85 %			
TSS Percent Removal ¹ (%)	85 %			
Footnote: (1) See Definition section at end of permit for explanation of terms				

IV. Water Quality-based Effluent Limits (WQBELs)

A. Scope and Authority

The Montana Water Quality Act (Act) states that a permit may only be issued if the Department finds that the issuance or continuance of the permit will not result in pollution of any state waters [75-5-401(2), Montana Code Annotated (MCA)]. Montana water quality standards at ARM 17.30.637(2) require that no wastes may be discharged such that the waste either alone or in combination with other wastes will violate or can reasonably be expected to violate any standard. ARM 17.30.1344(1) adopts by reference 40 CFR 122.44 which states that MPDES permits shall include limits on all pollutants which will cause, or have a reasonable potential to cause an excursion of any water quality standard, including narrative standards. The purpose of this section is to provide a basis and rationale for establishing WWTP effluent limits, based on Montana water quality standards that will protect designated uses of the receiving stream.

In accordance with 75-5-703(6)(b), MCA, after completion and approval of a Total Maximum Daily Load (TMDL), the Department shall incorporate the TMDL-developed waste load allocation(s) for

point sources into the appropriate discharge permits. This permit renewal incorporates the Lake Helena Watershed TMDL (EPA, Ref. 8-MO, September 27, 2006.)

B. Receiving Water

The East Helena WWTP discharges to Prickly Pear Creek (PPC) approximately one mile downstream of the crossing at Wylie Drive. PPC is in the Upper Missouri River watershed as identified by USGS Hydrologic Unit Code 10030101, and Montana stream segment MT41I006_030, PPC Highway 433 (Wylie Drive) Crossing to Helena WWTP Discharge.

PPC is classified “I” according to ARM 17.30.610(1)(a)(ix) as it does not fully support any one of its beneficial uses. The goal is for class I waters to fully support: drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supplies [ARM 17.30.628(1)].

This segment of PPC was not listed on the 1996 303(d) list of impaired water bodies in need of TMDL development. The 2006 303(d) lists this segment of the creek as not supporting aquatic life; cold and warm water fisheries; and drinking water. PPC is partially supportive of agricultural, industrial, and primary contact recreation. Probable causes of impairment are identified as metals (dissolved aluminum, antimony, arsenic, cadmium, copper, lead, and zinc), un-ionized ammonia, temperature, sedimentation/siltation, low flow alterations, physical substrate habitat alterations, and alteration in stream-side or littoral vegetative covers. The probable sources of these impairments include grazing in riparian or shoreline zones, irrigated crop production, on-site treatment systems (septic and similar decentralized systems), acid mine drainage, contaminated sediments, industrial point source discharge, habitat modification (other than hydromodification), and impacts from abandoned mine lands (inactive).

Stream segment MT41I006_040, immediately upstream of the receiving water, is considered to be a perennial stream and is documented as having a flow of less than 0.5 cfs below an irrigation diversion between East Helena and Wylie Drive (Source Assessment for the Lake Helena Watershed Planning Area, Part C.3.1.3, (*Water Quality Restoration Plan and Total Maximum Daily Loads (TMDLs) for the Lake Helena Watershed Planning Area: Volume I – Appendices*, USEPA, December 2004; hereinafter referred to as the TMDL Vol. I)

According to the Source Assessment for the Lake Helena Watershed Planning Area, Part C.3.1.4 TMDL Vol. I, stream segment MT41I006_030, in the area of discharge, experiences “severely depleted stream flows in summer”. The stream was rated as “non-functional” with the most detrimental impact identified as stream dewatering and “source assessment features included a dry streambed”. The Montana Fish, Wildlife and Parks (MFWP) MFISH website identifies river miles 7.3 to 18.5 (a segment of PPC encompassing the point of discharge) as an area of chronic dewatering where dewatering is a significant problem in all years of the assessment (MFWP 1991, 1997, 2003, and 2005). The permittee also reported periods of no flow for the upstream monitoring point, CRK-A, on the DMRs during July through September 2006 and 2007. The 7-day, 10-year low flow condition (7Q10) for PPC will be established as zero (0) cfs for the purposes of discharge limit development.

Fish species commonly present year-round include the longnose and white suckers. Rare species present can be the rainbow and brown trout (both species primarily migrate through this segment) and the brook trout as year-round residents. The mottled sculpin and longnose dace are year-round residents of unknown abundance (MFISH website, March 2008). Early life stages of each of these species can be present year-round (*Spawning Times of Montana Fishes* D.Skaar, MFWP, March 2001).

The previous permit required the permittee to monitor PPC upstream of the outfall location in East Helena (CRK-A, approximately 10 meters upstream of Outfall 001 in the mainstem PPC) for total recoverable metals (copper, lead, and zinc), total ammonia as N, pH, and temperature. Data were reported on the facility DMRs. For the purpose of characterizing the receiving water, data from the DMRs for the POR August 2003 through November 2008 were utilized. Instream total hardness as CaCO₃ data were collected by the permittee commensurate with the permit-required metals monitoring. These data were obtained from the permittee's contract laboratory reports for the POR.

Ambient water quality data for nutrients in PPC upstream of the WWTP discharge are minimal. The few data available were collected from station number M09PKPRC05 PPC, downstream of Wylie Drive yet upstream of the WWTP discharge point (TMDL Vol. I Appendix C). TN and TP data were obtained between August 2003 and July 2004.

Table 5. Prickly Pear Creek Upstream of Outfall 001

Parameter	Units	Number of Samples	Maximum	Minimum	Mean
Total Nitrogen	mg/L	3	0.34	<0.11	0.21
Total Phosphorus as P	mg/L	3	0.030	0.027	0.030
pH, Annual, median value	s.u.	46	9.16	5.36	7.27
pH, Summer ⁽¹⁾ , median value	s.u.	26	9.16	5.36	7.36
pH, Winter ⁽²⁾ , median value	s.u.	20	9.00	5.55	7.22
Temperature, Annual	°F	46	73.0	32.0	45.6
Temperature, Summer ⁽¹⁾	°F	26	73.0	39.5	51.8
Temperature, Winter ⁽²⁾	°F	20	62.2	32.0	37.5
Total Ammonia as N, Annual	mg/L	47	0.60	<0.1	0.11
Total Ammonia as N, Summer ⁽¹⁾	mg/L	27	0.10	<0.1	0.1
Total Ammonia as N, Winter ⁽²⁾	mg/L	20	0.60	<0.1	0.125
Total Hardness, as CaCO ₃	mg/L	45	149	46	105
Copper, Total Recoverable	mg/L	48	0.03	<0.01	0.012
Lead, Total Recoverable	mg/L	47	0.05	<0.01	0.013
Zinc, Total Recoverable	mg/L	48	0.18	<0.01	0.050
Chlorophyll <i>a</i>	mg/m ²	3	51	20	37.3
Footnotes:					
(1) Summer period is taken to be April 1 through October 31.					
(2) Winter period is taken to be November 1 through March 31.					

C. Applicable Water Quality Standards

Pursuant to ARM 17.30.628(2) discharges to “I” class waters may not violate the specific water quality standards listed under ARM 17.30.628(2)(a through k). In addition, discharges are subject to ARM 17.30.635 through 637, 641, 645, and 646. ARM 17.30.635(4) requires that the design condition for disposal systems must be based on the 7Q10 of the receiving water.

In September of 2006, the EPA approved the TMDL for the Lake Helena TMDL Planning Area (US EPA Ref. 8-MO, September 27, 2006). Enclosure 2 of the detailed EPA TMDL review acknowledges that phased Waste Load Allocations (WLA) are proposed for nutrient discharges from point sources. The adaptive management strategy (Part 3.2.3.1., Volume II, Final Report, August 2006) allows for the modification of limits through the rule-making process associated with the adoption of Montana nutrient standards and/or the adaptive management process, itself.

The Lake Helena TMDL presents a three-phased plan to reduce nutrient loading from the City of East Helena WWTP (Appendix I., Volume II, Final Report, August 2006). The phased approach is proposed in recognition of the fact that the permittee has recently committed significant amounts of money to upgrade the facility and that further upgrades to reduce nutrient loading may pose both financial and technical challenges.

The TMDL three-phased approach is summarized as follows. Phase I is described as the “No Increase” phase for the East Helena WWTP for TN and TP (Appendix I., Volume II, Final Report, August 2006). This phased process proposes adherence to the current WWTP performance at current daily flow rates for this permit cycle.

Phase I TMDL proposed action items not included in the permit but addressed by the permittee and the Department are:

- An ambient water quality monitoring program for Prickly Pear Creek,
- A Facility Optimization Study to define the maximum extent that nutrient concentrations/loads can be reduced given current facility infrastructure and available funding, and
- A Feasibility Study/Alternatives Analysis (FS/AA) to determine if, and how, the nutrient targets presented in the TMDL can be met. The FS/AA should consider both technical and economic feasibility relative to in-plant alternatives (i.e., engineering solutions) and influent/effluent alternatives. Examples of the latter may include: agricultural reuse, land application septic system sludge management, wetland treatment, and any other methods that may reduce nutrient loading.

Phase II is the “Optimization” phase where WLA limits for TN and TP may be “based on the literature to determine what is considered attainable”, with load limits based on design flows. MPDES permits may implement limits requiring enhanced levels of treatment based on the results of the TMDL action items, the facility optimization and FS/AA studies conducted during Phase I. The TMDL adaptive management strategy recognizes that limits may be modified based on the Phase I

action items. This phase is anticipated to be implemented with a compliance schedule/special condition in a future permit renewal.

Phase III is “water quality-based”, whereby WLA limits for TN and TP may be based on the best available data to meet instream interim nutrient targets; with load limits developed using the design flow of the facility. The TMDL adaptive management strategy allows for the modification of Phase III interim nutrient limits if deemed appropriate or necessary in the future. This would be accomplished through the rule-making process associated with the adoption of Montana nutrient standards and/or the adaptive management process, itself.

The Montana state standards for *Escherichia coli* (*E. coli*) bacteria replaced fecal coliform bacteria effective February 1, 2006. The applicable standards for *E. coli* are:

- a. April 1 through October 31, of each year, the geometric mean number of the microbial species *E. coli* must not exceed 126 colony forming units (cfu) per 100 milliliters (mL), nor are 10% of the total samples during any 30-day period to exceed 252 cfu per 100 mL [ARM 17.30.628(2)(a)(i)]; and
- b. November 1 through March 31, of each year, the geometric mean number of *E. coli* shall not exceed 630 cfu per 100 mL and 10% of the samples during any 30-day period may not exceed 1,260 cfu per 100 mL [ARM 17.30.628(2)(a)(ii)].

D. Mixing Zone

A mixing zone is an area where the effluent mixes with the receiving water and certain water quality standards may be exceeded [ARM 17.30.502(6)]. The Department must determine the applicability of currently granted mixing zones [ARM 17.30.505(1)]. Mixing zones allowed under a permit issued prior to April 29, 1993 will remain in effect unless there is evidence that previously allowed mixing zones will impair existing or anticipated uses [ARM 17.30.505(1)(c)]. Pollutant concentrations in the effluent must meet the applicable water quality standards at the end of pipe unless a mixing zone is recognized by the Department for that specific parameter in the permit.

In accordance with ARM 17.30.507(1)(b), acute water quality standards for aquatic life may not be exceeded in any portion of the mixing zone unless the Department finds that allowing minimal initial dilution will not threaten or impair existing uses. The discharge must also comply with the general prohibitions of ARM 17.30.637(1) which require that state waters, including mixing zones, must be free from substances which will:

- a. settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;
- b. create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials;
- c. produce odors, colors or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;

- d. create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; and
- e. create conditions which produce undesirable aquatic life.

Although certain standards may be exceeded in the mixing zone, an effluent in its mixing zone may not block passage of aquatic organisms nor may it cause acutely toxic conditions [ARM 17.30.602(16)]. No mixing zone will be granted that will impair beneficial uses [ARM 17.30.506(1)]. Aquatic life-chronic, aquatic life-acute and human health standards may not be exceeded outside of the mixing zone [ARM 17.30.507(1)(a)].

A standard mixing zone may be granted for facilities which discharge less than 1 mgd or when mixing is nearly instantaneous [ARM 17.30.516(3)(d)]. Nearly instantaneous mixing is assumed if the discharge is through an effluent diffuser, when the mean daily flow exceeds the 7-day, 10-year low flow (dilution ratio <1) or the permittee demonstrates through a Department approved study plan that the discharge is nearly instantaneous. A nearly instantaneous mixing zone may not extend downstream more than two (2) river widths.

Effluent discharges which do not qualify for a standard mixing zone must apply for a source specific mixing zone in accordance with ARM 17.30.518 and must conform to the requirements of 75-5-301(4), MCA which states that mixing zones must be the smallest practicable size; have minimal effects on uses; and, have definable boundaries. ARM 17.30.515(2) states that a person applying for a mixing zone must indicate the type of mixing zone and provide sufficient detail for the Department to make a determination regarding the authorization of the mixing zone under the rules of Subchapter 5.

Review of the administrative file shows that the Department-defined mixing zone in the 1997-issued permit was 1,400 feet in length downstream from the discharge point. This was predicated on an instream 7Q10 value of 2.98 cfs. As discussed in Section IV.B. of this Statement of Basis, the actual 7Q10 value for PPC in the area of discharge is zero cfs and the stream segment remains listed as impaired. Therefore, effluent limitations developed will apply to the discharge at the end-of-pipe and no mixing zone will be granted for the discharge with this permit renewal.

E. Basis and Proposed WQBELs

Parameters typically present in municipal wastewater that may cause or contribute to a violation of water quality standards include the conventional pollutants such as, biological material (as measured by BOD₅), suspended solids, oil & grease, pathogenic bacteria, and pH; the non-conventional pollutants such as total residual chlorine, total ammonia as N, TN, and TP; and the carcinogenic and toxic pollutants such as volatile organic carbon substances and metals which can include, but is not limited to, arsenic, cadmium, chromium, copper, cyanide, lead, mercury, molybdenum, nickel, selenium, silver, and zinc.

ARM 17.30.1345 requires WQBELs to be developed for any pollutant for which there is reasonable potential (RP) for discharges to cause or contribute to exceedences of instream numeric or narrative

water quality standards. RP calculations utilize the receiving water concentration, the maximum projected effluent concentration, the design flow of the wastewater treatment facility, and the applicable receiving water flow.

The Department uses a mass balance equation to determine RP (*Equation 1*).

$$C_{RP} = \frac{C_E Q_E + C_S Q_S}{Q_E + Q_S} \quad (Eq. 1)$$

Where:

C_{RP} = receiving water concentration (RWC) after mixing, mg/L
 C_E = maximum projected effluent concentration, mg/L
 C_S = RWC upstream of discharge, mg/L
 Q_S = applicable receiving water flow, mgd
 Q_E = facility design flow rate, mgd

The Department is proposing effluent limits for pollutants with RP for which adequate data exists.

1. Conventional Pollutants

TSS and BOD₅: The facility provides a significant reduction in biological material and solids through secondary treatment (Section III). No additional WQBELs will be required for these parameters.

Oil and Grease (O&G): The previous permit did not limit O & G in the effluent. The proposed O&G instantaneous maximum limit is 10 mg/L pursuant to ARM 17.30.637(1)(b). Monthly monitoring for O&G will be required.

***Escherichia coli* Bacteria:** The permit will incorporate the Montana state standards for *E. coli* bacteria. The Department is not granting a mixing zone for *E. coli* based on the following considerations: the potentially effluent-dominated nature of the receiving water (7Q10 equal to zero) and ARM 17.30.637(1)(e) which requires that state waters must be free from substances that are harmful or toxic to humans. ARM 17.30.505(2) states that if the Department determines that a mixing zone may interfere with or threaten a beneficial use, discharge limitations will be modified and if necessary, require the applicable numeric water quality criteria to be met at the end of the discharge pipe.

2. Nonconventional Pollutants

Total Ammonia as N: Total ammonia as N limits are developed based on standards that account for a combination of pH and temperature of the receiving stream, the presence or absence of salmonid species, and the presence or absence of fish in early life stages. Because pH and temperature can vary greatly on a seasonal basis, as can the presence or absence of fish in early life stages, Circular DEQ-7 allows for the determination of ammonia standards and the resulting limits on a seasonal basis. Salmonid fishes and their early life stages are presumed present year-round.

Table 6, presents the total ammonia as N water quality standards for PPC using the ambient water quality data in Table 5.

Table 6. Total Ammonia as N Water Quality Standards for PPC

Condition	Period ⁽¹⁾	Salmonids Present	Early Life Stages Present	Ambient Condition		Water Quality Standard ⁽²⁾ (mg/L)
				pH	Temperature °C	
Acute	Annual	Yes	NA	8.80 ⁽³⁾	NA	1.23
Chronic	Summer	NA	Yes	8.24 ⁽⁴⁾	14.6 ⁽⁴⁾	1.47
Chronic	Winter	NA	Yes	8.32 ⁽⁴⁾	3.6 ⁽⁴⁾	1.67

Footnotes: NA – Not Applicable
 (1) Winter period is taken to be November 1 through March 30; summer period is taken to be April 1 through October 30.
 (2) 30-day average concentration, based on Department Circular DEQ-7 (February 2008)
 (3) Based on 95th percentile of annual data.
 (4) Based on 75th percentile of values in the applicable period.

The maximum reported total ammonia as N value, 15.5 mg/L, exceeds the state standards for total ammonia as N. Reasonable potential (RP) to exceed the acute water quality standard for total ammonia as N was assessed using *Equation 1*, where:

$$\begin{aligned}
 C_{RP} &= \text{receiving water concentration after mixing, mg/L} \\
 C_E &= \text{projected maximum effluent concentration, 31.1 mg/L} \\
 C_S &= \text{RWC upstream of discharge, 0.11 mg/L} \\
 Q_S &= \text{applicable receiving water flow, 7Q10, 0 mgd} \\
 Q_E &= \text{facility design flow rate, 0.434 mgd}
 \end{aligned}$$

The projected maximum effluent concentration for total ammonia as N was found following the method recommended by the EPA *Technical Support Document for Water Quality-based Toxics Control* (TSD, 1991). A multiplier of 2.0 was determined using Table 3-2 in the TSD (given a coefficient of variation of 2.99 and a sample size of 52 at the 95% confidence interval.) The maximum reported effluent total ammonia as N concentration over the POR was 15.5 mg/L. The projected maximum effluent concentration is the multiplier times the maximum reported concentration (2.0*15.5 mg/L) is 31.1 mg/L.

The resultant receiving water concentration is:

$$C_{RP} = \frac{(0.434 * 31.1) + (0 * 0.11)}{(0.434 + 0)} = 31.1 \text{ mg/L}$$

This value is greater than any of the calculated summer or winter chronic total ammonia-N standards and the annual acute standard, therefore, RP exists for this parameter and limits are necessary. There is no instream dilution flow available for mixing, therefore the acute standard becomes the limiting condition and the permittee will be expected to meet the acute standard of 1.23 mg/L as the limit at the end of pipe at all times. The year-round maximum daily limit (MDL) is 1.23 mg/L.

Nutrients (TN and TP): Pursuant to 75-5-703(6)(b), MCA, the Department is incorporating the applicable portions of Phase I of the EPA-developed and approved TMDL in this permit renewal. Phase I for TN and TP is based on a “No Increase” condition given current plant performance and flow (TMDL Final Report Appendix I. August 2006).

Lacking numeric water quality standards for TN and TP, limitations are developed as average monthly and average weekly loads based on the current plant flow and the performance of the WWTP. This approach uses existing nutrient loads as obtained from the corrected DMRs for Outfall 001 over the POR. Calculations and results are presented in Attachment B.

The Average Weekly Limit (AWL) and Average Monthly Limit (AML) were developed using the long term average of the data set and the long term average (LTA) multipliers for the 99th percentile based on the statistics of the data set (TSD, 1991). These limits take into account the variability of the effluent quality and will apply to the effluent prior to mixing with the receiving water at Outfall 001 (no mixing zone).

The formulae used are as follows:

$$\text{MDL} = \text{LTA} e^{[2.326S - 0.5(S*S)]}, \text{ use EPA TSD, Table 5-2 for 99}^{\text{th}} \text{ percentile,}$$

$$\text{AML} = \text{LTA} e^{[2.326S - 0.5(S*S)]}, \text{ use EPA TSD, Table 5-2 for 99}^{\text{th}} \text{ percentile, } n = 4$$

Table 7. Proposed Nutrient Load Limitations for Outfall 001

Parameter	Units	Load	
		Average Monthly Limit ⁽¹⁾	Average Weekly Limit ⁽¹⁾
Total Nitrogen ⁽²⁾	lb/day	53.3	75.8
Total Phosphorus as P	lb/day	11.2	16.5
Footnotes:			
(1) See Definition section at end of permit for explanation of terms.			
(2) Calculated from the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.			

Dissolved Oxygen (DO): Low DO levels can be a typical pollutant of concern for POTWs. Freshwater aquatic life standards are characterized by the fishery (cold- or warm-water) and by the presence or absence of fish in early life stages (Circular DEQ-7); they are presented in Table 8, below. Standards are further defined based on a specific period of time and required in-stream DO

levels. The WWTP is an aerated activated sludge facility with short retention times. DO has not been monitored at this facility in previous permit cycles and is not routinely monitored as part of the facility process control.

Table 8. DO Standards For Waters Classified as “P” (Circular DEQ-7).

Condition	30-Day Mean (mg/L)	7-Day Mean (mg/L)	7-Day Mean Minimum (mg/L)	1-Day Minimum ⁽¹⁾ (mg/L)
Early Life Stages ⁽²⁾	NA ⁽³⁾	6.0	NA ⁽³⁾	5.0
Other Life Stages	5.5	NA ⁽³⁾	5.0	3.0
Footnotes: (1) All minima should be considered as instantaneous concentrations to be achieved at all times. (2) Includes all embryonic and larval stages and all juvenile forms of fish to 30-days following hatching. (3) NA = Not Applicable				

No limit for DO is proposed; however, the permittee will be required to monitor DO levels in the effluent during this permit cycle. Due to the short retention time of the facility and past losses of power to the aeration system for up to six hours (personal communication with Public Works Director, April 9, 2008), daily monitoring of the effluent for DO will be included in this permit cycle.

Total Residual Chlorine (TRC): At present, the permittee utilizes UV disinfection rather than chlorination. The previous permit had a limit of 0.05 mg/L for TRC. In the event chlorination is employed at the facility, an effluent WQBEL of 0.011 mg/L chronic limitation (monthly average) and 0.019 acute limitation (daily maximum) shall be applied to the discharge at the end of pipe in accordance with Circular DEQ-7 due to the presence of aquatic organisms in early life stages in the receiving water year-round.

pH: Pursuant to ARM 17.30.628(2)(c), the induced variation of hydrogen ion concentration within the range of 6.5 to 9.5 must be less than 0.5 pH units. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0. The TBEL for pH requires effluent pH to be maintained between 6.0 and 9.0 s.u. To assure the WQBEL and TBEL for pH in the effluent is met, the pH range will be maintained between 6.5 and 9.0 s.u. pH in the effluent will be monitored on a daily basis.

3. Toxic Pollutants

ARM 17.30.623(2)(j) states that concentrations of carcinogenic, bio-concentrating, toxic, or harmful parameters which would remain in the water after conventional treatment may not exceed the applicable standards specified in Circular DEQ-7.

Metals - All metals discussions refer to the metals in their “total recoverable” fraction with the exception of aluminum which is regulated and monitored in the dissolved form. As a facility with a permit-required pretreatment program, the permittee was to submit effluent metals characterization data with the renewal application (Part D. of EPA application Form 2A). These data were not

submitted to the Department. Effluent and upstream monitoring of PPC were required for copper, lead, and zinc in the previous permit cycle; data are presented in Tables 3 and 5, respectively. The previous permit contained the following narrative limit for effluent metals, specifically copper, lead, and zinc:

“Except for ammonia toxicity, there shall be no acute toxicity in the discharge when the receiving stream flow is greater than zero, except when the instream concentration (*sic*) for lead, zinc or copper exceed Water Quality Standards. Then the concentration in the discharge for the above metals will be limited to the instream concentrations”.

Applicable surface water standards for aquatic life and human health for the above mentioned metals are summarized in Table 9 for PPC. These standards are calculated using the 25th percentile value for the upstream total hardness data set as obtained from the permittee’s contract laboratory reports for January 2003 through November 2007 (97 mg/L as CaCO₃). The 25th percentile, low hardness condition is used to be protective of the receiving water year-round.

Table 9. PPC Metals Surface Water Standards (Circular DEQ-7)

Parameter	Units	Required Reporting Value (RRV)	Human Health Standard	Aquatic Life Standard ⁽¹⁾	
				Acute	Chronic
Aluminum (Dissolved)	mg/L	0.030	--	0.750	0.087
Antimony, Total Recoverable	mg/L	0.003	0.0056	--	--
Arsenic, Total Recoverable	mg/L	0.003	0.010	0.34	0.15
Cadmium, Total Recoverable	mg/L	0.00008	0.005	0.002	0.0003
Copper, Total Recoverable	mg/L	0.001	1.30	0.014	0.009
Lead, Total Recoverable	mg/L	0.0005	0.015	0.078	0.003
Zinc, Total Recoverable	mg/L	0.010	2.00	0.12	0.12
Footnotes:					
(1) Applicable metals standards calculated using the 25 th percentile upstream total hardness value of 97 mg/L as CaCO ₃					

A summary of the instream (PPC upstream sample location) and effluent sample results for copper, lead, and zinc is presented in Table 10. For copper, the effluent concentrations were greater than the measured upstream concentrations 35 out of 48 samples; for lead, effluent levels exceeded upstream concentrations 5 out of 48 samples; and 20 out of 48 effluent samples had higher zinc concentrations than the upstream samples.

Table 10. Instream and Effluent Metals Standard Exceedences August 2003 through November 2007.

Parameter	Number of Samples		Number of Standard Exceedences			
	Upstream	Effluent	Upstream		Effluent	
			acute	chronic	acute	chronic
Total Recoverable Copper	48	48	11	48	36	48
Total Recoverable Lead	47	48	0	47	0	48
Total Recoverable Zinc	48	48	0	1	0	0

Anti-backsliding provisions of the Federal Clean Water Act and 40 CFR 122.44(l) (adopted by reference at ARM 17.30.1344) prohibit the reissuance of an existing MPDES permit with effluent limits less stringent than those established in a previous permit. With this permit renewal, WQBELs will be developed for the metals for which previous narrative effluent limits were developed (copper, lead, and zinc) and these numeric limits will replace the narrative limits with this permit renewal. Due to the 7Q10 value of zero, the metals standards for copper, lead, and zinc, as presented above in Table 9, will be established as the effluent limits applied to the discharge at the end of pipe (Table 11).

Table 11. Outfall 001 Final Effluent Metals Limitations

Parameter	Units	RRV	Limitations	
			Maximum Daily ⁽¹⁾	Average Monthly ⁽¹⁾
Copper, Total Recoverable	mg/L	0.001	0.014	0.009
Lead, Total Recoverable	mg/L	0.0005	0.078	0.003
Zinc, Total Recoverable	mg/L	0.010	0.12	0.12
Footnotes:				
(1) See Definition section at end of permit for explanation of terms.				

Monitoring of effluent and PPC upstream of Outfall 001 for copper, lead, and zinc will continue. Dissolved aluminum, antimony, arsenic, and cadmium monitoring will be included in the effluent and instream monitoring requirements with this renewal because these metals are on the 2006 303(d) list as probable causes of impairment and the potential industrial indirect discharges of metals to the POTW. The permittee will be required to assure laboratory analyses for all metals meet the Required Reporting Values listed in Circular DEQ-7 and presented in Tables 9 and 11.

To support the assessment of the industrial pretreatment program, a metals source investigation requirement will be added to the permit (see Section VIII.A. of this Statement of Basis). Full metals sampling for both influent and effluent will be conducted in accordance with the metals source investigation part of the industrial pretreatment expectations in Part I.D.3. of the permit. These data can also be used to support the renewal application metals reporting expectations. A requirement to perform WET testing will also monitor potential toxicity due to metals in the effluent.

Organic Substances: As a facility with a permit-required pretreatment program, the permittee was required to submit effluent organics characterization data with the renewal application (Part D. of EPA application Form 2A). These data were not submitted to the Department. Monitoring for organic substances in the effluent has not been performed previously at this facility. There is a lack of information available to perform an RP assessment. Therefore, sampling of the effluent for organic substances will be conducted to support the renewal application or to comply with the industrial pretreatment program in the permit if enacted. A requirement to perform WET testing will also monitor potential toxicity due to organic compounds in the effluent.

Whole Effluent Toxicity (WET) Testing: ARM 17.30.637(1)(d) requires that state water be free from substances attributable to municipal waste that create conditions which are harmful or toxic to human, animal, plant or aquatic life, except the Department may allow limited toxicity in a mixing

zone provided that there is no acute lethality to organisms. The previous permit included a narrative limit that prohibited acute toxicity in the discharge (with the exception of ammonia toxicity) when the receiving stream flow is greater than zero (see page 17, above); there was no requirement for WET monitoring. An assessment of WET in the effluent has not been performed at this facility.

The receiving water is effluent dominated (dilution ratio < one) and effluent metals data for copper and lead indicate the potential for acute and /or chronic toxicity due to metals in the discharge. This renewal has applied the more stringent acute limit to total ammonia as N and acute and chronic limits to listed metals in the effluent, the pollutants of concern regarding the nature of the effluent. The prohibition on acute toxicity in the effluent has been removed because acute chemical-specific WQBELs have been proposed at the end of pipe.

The permittee will be required to monitor potential toxicity in the effluent by means of quarterly acute WET testing on two species, in accordance with the EPA Region VIII NPDES *Whole Effluent Toxics Control Program*, August 1997, ARM 17.30.1322(6)(j), and the permit.

V. Effluent Limitations

The proposed final effluent limits are a combination of the more stringent of the technology-based and water quality-based effluent limits as developed in Sections III and IV.

Outfall 001

Interim Limitations

The following interim effluent limitations will be applied to the discharge at Outfall 001 on the effective date of the permit and remain in effect until midnight, December 31, 2012.

Table 12. Outfall 001 Interim Limitations

Parameter	Units	Average Monthly Limit ⁽¹⁾	Average Weekly Limit ⁽¹⁾	Maximum Daily Limit ⁽¹⁾
BOD ₅	mg/L	30	45	--
	lb/day	109	163	--
TSS	mg/L	30	45	--
	lb/day	109	163	--
<i>E. coli</i> Bacteria ⁽²⁾	cfu/100 mL	126	252	--
<i>E. coli</i> Bacteria ⁽³⁾	cfu/100 mL	630	1,260	--
Oil and Grease	mg/L	--	--	10
Total Ammonia as N	mg/L	--	--	1.23
Total Residual Chlorine ⁽⁴⁾	mg/L	0.011	--	0.019
Copper, Total Recoverable	mg/L	0.009		0.014
Lead, Total Recoverable	mg/L	0.003	--	0.078
Zinc, Total Recoverable	mg/L	0.12	--	0.12
Footnotes: (1) See Definition section at end of permit for explanation of terms. (2) This limit applies during the period April 1 through October 31. (3) This limit applies during the period November 1 through March 31. (4) The Permittee will be in compliance with the applicable effluent limitation if each measured total residual chlorine concentration is less than 0.10 mg/L.				

pH: Effluent pH from Outfall 001 shall remain between 6.5 and 9.0 standard units (instantaneous minimum and instantaneous maximum). For compliance purposes, any single analysis or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

85 Percent (%) Removal Requirement for TSS and BOD₅: The arithmetic mean of the BOD₅ and TSS and for effluent samples collected in a period of 30 consecutive days shall not exceed 15% of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85% removal). This is in addition to the concentration limitations on BOD₅ and TSS.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

There shall be no discharge which causes visible oil sheen in the receiving stream.

Final Limitations

The following final effluent limitations will be applied to the discharge at Outfall 001 beginning on January 1, 2013 and will remain in effect through the duration of the permit.

Table 13. Outfall 001 Final Limitations

Parameter	Units	Average Monthly Limit ⁽¹⁾	Average Weekly Limit ⁽¹⁾	Maximum Daily Limit ⁽¹⁾
BOD ₅	mg/L	30	45	--
	lb/day	109	163	--
TSS	mg/L	30	45	--
	lb/day	109	163	--
<i>E. coli</i> Bacteria ⁽²⁾	cfu/100 mL	126	252	--
<i>E. coli</i> Bacteria ⁽³⁾	cfu/100 mL	630	1,260	--
Oil and Grease	mg/L	--	--	10
Total Ammonia as N	mg/L	--	--	1.23
Total Nitrogen Load ⁽⁴⁾	lb/day	53.3	75.8	--
Total Phosphorus as P Load	lb/day	11.2	16.5	--
Total Residual Chlorine ⁽⁵⁾	mg/L	0.011	--	0.019
Copper, Total Recoverable	mg/L	0.009	--	0.014
Lead, Total Recoverable	mg/L	0.003	--	0.078
Zinc, Total Recoverable	mg/L	0.12	--	0.12
Footnotes: (1) See Definition section at end of permit for explanation of terms. (2) This limit applies during the period April 1 through October 31. (3) This limit applies during the period November 1 through March 31. (4) Calculated as the sum of Total Kjeldahl Nitrogen (TKN) and nitrate plus nitrite as N concentrations. (5) The Permittee will be in compliance with the applicable effluent limitation if each measured total residual chlorine concentration is less than 0.10 mg/L.				

pH: Effluent pH from Outfall 001 shall remain between 6.5 and 9.0 standard units (instantaneous minimum and instantaneous maximum). For compliance purposes, any single analysis or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

85 Percent (%) Removal Requirement for TSS and BOD₅: The arithmetic mean of the BOD₅ and TSS and for effluent samples collected in a period of 30 consecutive days shall not exceed 15% of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85% removal). This is in addition to the concentration limitations on BOD₅ and TSS.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

There shall be no discharge which causes visible oil sheen in the receiving stream.

VI. Self-Monitoring Requirements

A. Effluent Monitoring

The permittee shall monitor the discharge from Outfall 001 at the last point of control following treatment (post UV disinfection system). Monitoring frequencies are increased to assess compliance with seven-day and 30-day effluent limitations and for an activated sludge treatment system with no influent characterization and short retention times (design approximately 16 hours). Self-monitoring requirements are summarized in Table 14. Additional effluent self-monitoring requirements can be found in Table 15.

Samples shall be collected, preserved and analyzed in accordance with approved procedures listed in 40 CFR 136. In order to be representative of the nature and volume of the flow being monitored, influent sample collection and flow monitoring must occur prior to the equalization basin or any recycle flow returns. Effluent flow measuring must account for all draw-off and return flows.

The RRV is the detection level that must be achieved in reporting surface water monitoring or compliance data to the Department (Circular DEQ-7). The RRV is the Department's best determination of a level of analysis that can be achieved by the majority of the commercial, university, or governmental laboratories using EPA-approved methods or methods approved by the Department.

The EPA-approved analytical methods in 40 CFR Part 136 require TRC samples to be analyzed immediately. On-site analysis of TRC using an approved method is required. The method must achieve a minimum detection level of 0.10 mg/L. The Permittee will be in compliance with the applicable effluent limitation if each measured total residual chlorine concentration is less than 0.10 mg/L.

Table 14. Outfall 001 Self-Monitoring Requirements

Parameter	Unit	Sample Location	Sample Frequency	Sample Type ⁽¹⁾	RRV
Flow	mgd	Influent	Continuous	⁽²⁾	--
	mgd	Effluent	Continuous	⁽²⁾	--
5-Day Biological Oxygen Demand (BOD ₅)	mg/L	Influent	3/Week	Composite	2
	mg/L	Effluent	3/Week	Composite	2
	lb/day	Effluent	1/Month	Calculated	--
	% Removal ⁽³⁾	Effluent	1/Month	Calculated	--
Total Suspended Solids (TSS)	mg/L	Influent	3/Week	Composite	10
	mg/L	Effluent	3/Week	Composite	10
	lb/day	Effluent	1/Month	Calculated	--
	% Removal ⁽³⁾	Effluent	1/Month	Calculated	--
pH	s.u.	Effluent	Daily	Instantaneous	0.1
Temperature	°C	Effluent	Daily	Instantaneous	--
Total Residual Chlorine ⁽⁴⁾	mg/L	Effluent	Daily	Grab	0.10
<i>E. coli</i> Bacteria ⁽⁵⁾	cfu/100 mL	Effluent	3/Week	Grab	1
Total Ammonia as N	mg/L	Effluent	1/Week	Composite	0.1
Nitrate + Nitrite as N	mg/L	Effluent	1/Week	Composite	0.05
Total Kjeldahl Nitrogen	mg/L	Effluent	1/Week	Composite	0.1
Total Nitrogen ⁽⁶⁾	mg/L	Effluent	1/Month	Calculated	--
	lb/day	Effluent	1/Month	Calculated	--
	tons/year	Effluent	1/Year	Calculated	--
Total Phosphorus as P	mg/L	Effluent	1/Week	Composite	--
	lb/day	Effluent	1/Month	Calculated	--
	tons/year	Effluent	1/Year	Calculated	--
Dissolved Oxygen	mg/L	Effluent	1/Day	Grab	1
Oil and Grease ⁽⁷⁾	mg/L	Effluent	1/Month	Grab	1
Total Dissolved Solids	mg/L	Effluent	1/Quarter	Grab	10
Whole Effluent Toxicity, Acute ⁽⁸⁾	% Effluent	Effluent	1/Quarter	Composite	--

Footnotes:

- (1) See Definition section at end of permit for explanation of terms.
- (2) Requires recording device or totalizer; permittee shall report daily maximum and daily average flow on DMR.
- (3) Percent (%) Removal shall be calculated using the monthly average values.
- (4) The Permittee is only required to sample for total residual chlorine if chlorine is used as a disinfectant in the treatment process. If chlorine is *not* used, write "NA" on the DMR for this parameter.
- (5) Report Geometric Mean if more than one sample is collected during reporting period.
- (6) Calculated as the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.
- (7) Collect a sample and analyze using EPA Method 1664, Revision A: N-Hexane Extractable Material (HEM) or equivalent.
- (8) Sampling for this parameter is required starting first full calendar quarter (June 1 through August 31, 2009) following the effective date of the permit.

Table 15. Outfall 001 Additional Monitoring Requirements

Parameter	Units	Sample Frequency	Sample Type ⁽¹⁾	RRV
Aluminum, Dissolved	mg/L	1/Month	Composite	0.030
Antimony, Total Recoverable ⁽²⁾	mg/L	1/Month	Composite	0.003
Arsenic, Total Recoverable ⁽²⁾	mg/L	1/Month	Composite	0.003
Cadmium, Total Recoverable ⁽²⁾	mg/L	1/Month	Composite	0.00008
Copper, Total Recoverable ⁽²⁾	mg/L	1/Month	Composite	0.001
Lead, Total Recoverable ⁽²⁾	mg/L	1/Month	Composite	0.0005
Zinc, Total Recoverable ⁽²⁾	mg/L	1/Month	Composite	10
Beryllium, Total Recoverable ⁽²⁾	mg/L	2/year	Composite	1
Chromium, Total Recoverable ⁽²⁾	mg/L	2/year	Composite	10
Mercury, Total Recoverable ⁽²⁾	mg/L	2/year	Composite	0.1
Nickel, Total Recoverable ⁽²⁾	mg/L	2/year	Composite	10
Selenium, Total Recoverable ⁽²⁾	mg/L	2/year	Composite	1
Silver, Total Recoverable ⁽²⁾	mg/L	2/year	Composite	1
Thallium, Total Recoverable ⁽²⁾	mg/L	2/year	Composite	1
Cyanide, Total	mg/L	2/year	Grab	5
Phenols, Total	mg/L	2/year	Grab	10
Total Hardness as CaCO ₃	mg/L	1/Month	Composite	10
Volatile Organic Pollutants ^(3, 4)	mg/L	2/year	Composite	⁽⁵⁾
Semi-Volatile, Acid Compounds ^(3, 4)	mg/L	2/year	Composite	⁽⁵⁾
Semi-Volatile, Base Neutral ^(3, 4)	mg/L	2/year	Composite	⁽⁵⁾

Footnotes:

- (1) See Definition section at end of permit for explanation of terms.
- (2) Metals shall be analyzed as total recoverable, use EPA Method (Section) 4.1.4 [EPA 600/4-79-020, March 1983] or equivalent. Sampling for these parameters required in accordance with the pretreatment metals assessment, source investigation or during third and fourth full calendar years of permit cycle only.
- (3) 40 CFR 122, Appendix D, Table II.
- (4) Sampling for these parameters required in accordance with pretreatment program requirements and/or during third and fourth full calendar years (2012 and 2013) of permit cycle only.
- (5) See approved method for minimum level.

B. Instream Monitoring

The permittee will be required to continue monitoring PPC upstream of the outfall at the previously established CRK-A sample point for the parameters listed in Table 16, below.

Table 16. Ambient Water Quality PPC Monitoring Requirements

Parameter	Units	Sample Location	Sample Frequency	Sample Type ⁽¹⁾	RRV
pH	s.u.	Instream	1/Month	Instantaneous	0.1
Temperature	°C	Instream	1/Month	Instantaneous	--
Total Hardness as CaCO ₃	mg/L	Instream	1/Month	Grab	10
Aluminum, Dissolved	mg/L	Instream	1/Month	Grab	0.030
Antimony, Total Recoverable	mg/L	Instream	1/Month	Grab	0.003
Arsenic, Total Recoverable	mg/L	Instream	1/Month	Grab	0.003
Cadmium, Total Recoverable	mg/L	Instream	1/Month	Grab	0.00008
Copper, Total Recoverable	mg/L	Instream	1/Month	Grab	0.001
Lead, Total Recoverable	mg/L	Instream	1/Month	Grab	0.0005
Zinc, Total Recoverable	mg/L	Instream	1/Month	Grab	10
Footnotes: (1) See Definition section at end of permit for explanation of terms					

VII. Nonsignificance Determination

As discussed in the previous sections, the proposed effluent limits and discharge flows for the East Helena WWTP discharge do not allow for or constitute a new or increased source of pollutants pursuant to ARM 17.30.702(18). Therefore, a nonsignificance analysis is not required [ARM 17.30.705(1)].

VIII. Special Conditions

A. Pretreatment Source Metals Assessment

Pretreatment requirements in MPDES permits are under the primacy of the US EPA. The Montana office of EPA Region VIII provided the following language to address the pretreatment portion of this permit renewal.

The expired permit required the permittee to implement and enforce pretreatment requirements including specific local limits, controlling the contribution from each Industrial User (IU) to ensure compliance, analyses of influent and effluent for metals on a quarterly basis, and annual reporting. At the time of issuance of the previous permit, there were at least two SIUs discharging to the WWTP: ASARCO and American Chemet. Since permit issuance in 1997, the City reports both SIUs have ceased discharge of process wastewater to the WWTP, however this has not been corroborated by the Department. To date, the pretreatment program has not been implemented.

EPA's pretreatment regulations state that the agency may require a POTW with a design flow of less than five mgd to develop a Pretreatment Program if necessary to prevent pass through. Metals data collected by the permittee over the last four years show exceedences of the water quality standards demonstrating that pass through is occurring. However, it is not known whether the metals in the effluent are coming from IUs or from some other source such as storm water.

In order to determine whether an industrial pretreatment program is necessary, a metals source investigation requirement will be added to the permit. If the permittee can demonstrate that the source of the metals is not from IUs, EPA will not require the permittee to implement a pretreatment program. The permittee will be expected to conduct a metals source assessment at the POTW in accordance with the permit as follows:

1. Within 90 days of the effective date of this permit, the permittee shall submit a metals sampling plan to EPA for review and approval which is designed to determine the sources of metal inputs to the POTW. Sampling shall include, but not be limited to: influent, effluent, sludge, storm drains, and storm water. Upon EPA's approval and/or modification of the plan, the permittee will implement the sampling plan.
2. Within 180 days of the effective date of the permit, the permittee shall initiate and conduct an IU survey of the POTW service area. The survey shall include all sources of non-domestic indirect discharge. All IUs discharging non-sanitary wastewater to the sanitary sewer will be identified. Survey information will include a description of the processes generating wastewater, the discharge flow (rates and volumes), and the pollutants discharged (concentrations and loads).
3. Within 270 days of the effective date of the permit, the permittee shall submit a report describing the results of the sampling effort and the IU survey, identifying the sources of metals discharges to the POTW. EPA and the Department will review the report and determine whether implementation of an Industrial Pretreatment Program is necessary. Should the agencies determine a pretreatment program is necessary, the Department will proceed with a major modification of the permit to include the pretreatment requirements.

B. Facility Flow Monitoring

The permittee indicated that an average of 0.054 mgd of effluent is used for on site irrigation purposes from approximately May through October. Current draw off points for non-potable service water and irrigation water are post effluent flow monitoring. The permittee is required to accurately monitor flow in accordance with 75-5-602, MCA. Accurate flow monitoring will be required for WWTP effluent, non-potable service water, and irrigation water if draw-off continues to occur post effluent flow monitoring.

By midnight June 30, 2009, the permittee shall provide the Department with a description and plan to accurately monitor flow in accordance with 75-5-602, MCA.

C. Land Application of Treated Effluent

The permittee uses treated WWTP effluent for irrigation on site at the POTW. As much as one-quarter of the current average daily flow (0.054 mgd out of 0.258 mgd average daily flow) is spray irrigated on 4.6 acres of lawns, dikes and berms each day between May and October. The permittee did not identify the land application of wastewater on application Form 2A as required.

In the May 14, 2007 compliance inspection report, it was noted that, "With the use of effluent for lawn irrigation, supplemental information about this activity will be required to be submitted as an attachment to the application on file with the Department." The permittee did not update the renewal application to include the land application of treated effluent as requested in the May 14, 2007 inspection report, nor in response to the Department's additional request dated December 17, 2007. The permittee did not submit an updated application after further requests for update of the application (compliance inspection report dated January 7, 2008 and letter of February 29, 2008). A letter from the permittee dated April 2, 2008, did provide an estimation of acreage under irrigation and the daily and annual irrigation volume.

The permittee must immediately cease the land application of treated effluent on site or, within one year of the date of issuance of the permit, submit the necessary fees and application materials for a major modification of permit to obtain permit coverage for the land application of treated effluent on site. This activity will be covered under a Special Condition in the permit at the time of modification, if requested.

IX. Information Sources

1. Administrative Rules of Montana Title 17 Chapter 30 - Water Quality
 - a. Sub-Chapter 2 - *Water Quality Permit and Application Fees*, March 2006.
 - b. Sub-Chapter 5 - *Mixing Zones in Surface and Ground Water*, March 2006.
 - c. Sub-Chapter 6 - *Montana Surface Water Quality Standards and Procedures*, March 2006.
 - d. Sub-Chapter 7- *Nondegradation of Water Quality*, March 2006.
 - e. Sub-Chapter 10 - *Montana Ground Water Pollution Control System*, June 2006.
 - f. Sub-Chapter 12 - *Montana Pollutant Discharge Elimination System (MPDES) Standards*, March 2007.
 - g. Sub-Chapter 13 - *Montana Pollutant Discharge Elimination System (MPDES) Permits*, June 2006.
2. Clean Water Act § 303(d), 33 USC 1313(d) *Montana List of Waterbodies in Need of Total Maximum Daily Load Development*, 1996 and 2006.
3. Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. §§ 1251-1387, October 18, 1972, as amended 1973-1983, 1987, 1988, 1990-1992, 1994, 1995 and 1996.
4. Montana Code Annotated Title 75 - Environmental Protection Chapter 5 - Water Quality, October 2002.

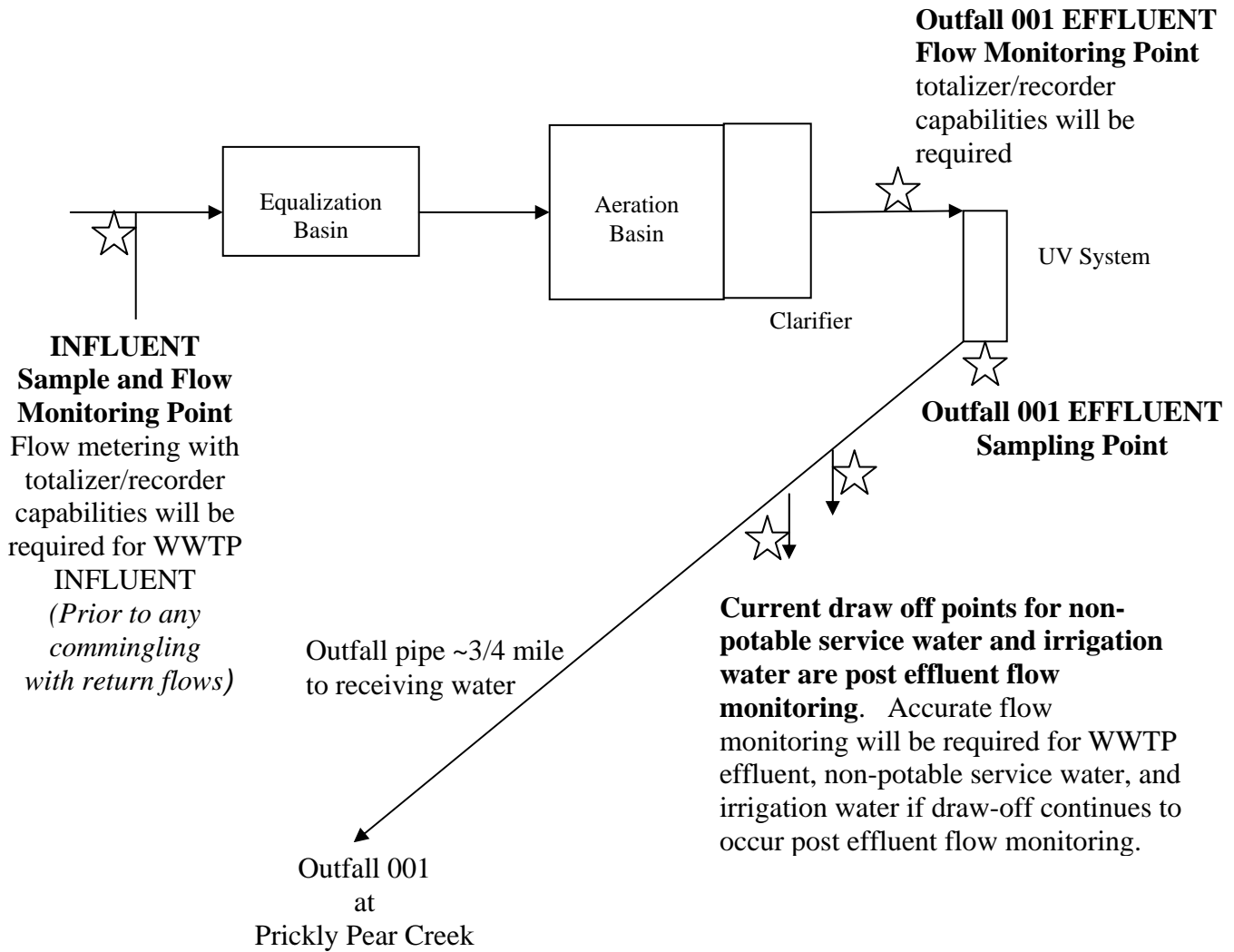
5. Montana Department of Environmental Quality Circular DEQ-2, *Design Standards for Wastewater Facilities*, September 1999.
6. Montana Department of Environmental Quality Circular DEQ-7, *Montana Numeric Water Quality Standards*, February 2008.
7. Montana Department of Fish Wildlife and Parks, *Spawning Times of Montana Fishes*, March 2001.
8. Montana Pollutant Discharge Elimination System (MPDES) Permit Number MT0022560
 - a. Administrative Record.
 - b. Renewal Application EPA Form 2A, December 2004.
 - c. Compliance Inspection Reports, May 14, 2007 and January 7, 2008.
9. US Code of Federal Regulations, 40 CFR Parts 122-125, 130-133, & 136.
10. US Code of Federal Regulations, 40 CFR Part 403 – *General Pretreatment Regulations for Existing and New Sources of Pollution*.
11. US Code of Federal Regulations, 40 CFR Part 503 – *Standards for the Use or Disposal of Sewage Sludge*.
12. US Department of the Interior US Geological Survey, *Statistical Summaries of Streamflow in Montana and Adjacent Areas, Water Years 1900 through 2002*, Scientific Investigations Report 2004-5266, 2004.
13. US EPA *Technical Support Document for Water Quality-Based Toxics Control*, EPA/505/2-30-001, March 1991.
14. USEPA Region VIII *Mixing Zones and Dilution Policy*, September 1995.
15. US EPA NPDES *Permit Writers' Manual*, EPA 833-B-96-003, December 1996.
16. US EPA Region VIII NPDES *Whole Effluent Toxics Control Program*, August 1997.
17. US EPA for Montana Department of Environmental Quality *Framework Water Quality Restoration Plan and Total Maximum Daily Loads (TMDLs) for the Lake Helena Watershed Planning Area*:
 - a. Volume I – Appendices, December 2004.
 - b. Volume II – Final Report, August 2006.
18. US EPA Ref. 8-MO, TMDL Approvals, *Lake Helena Total Maximum Daily Load Planning Area* and Enclosures, September 27, 2006.
19. US EPA NPDES *Permit Writers' Course Manual*, EPA-833-B-91-001, April 2003.

20. University of Montana-Helena, *City of East Helena Public Water Supply (PWSID # MT0000196) Source Water Delineation and Assessment Report*, November 2002.

Prepared by: MK Valett, January 28, 2009

Attachment A

Schematic of East Helena WWTP with Sample and Flow Monitoring Points



Attachment B. Nutrient Limit Calculations

Month		Total Nitrogen TN (lb/day)	Total Phosphorus as P TP (lb/day)
Aug-03		23.3	3.78
Sep-03		40.1	5.36
Oct-03		52.3	4.37
Nov-03		52.5	7.54
Dec-03		54.3	7.81
Jan-04		41.3	4.90
Feb-04		42.6	5.33
Mar-04		44.5	6.19
Apr-04		32.1	4.53
May-04		28.2	3.93
Jun-04		25.9	5.70
Jul-04		13.5	2.13
Aug-04		17.0	3.07
Sep-04		38.3	6.73
Oct-04		37.4	6.82
Nov-04		32.1	5.58
Dec-04		30.0	4.99
Jan-05		18.1	5.27
Feb-05		25.6	5.66
Mar-05		29.6	6.13
Apr-05		50.7	10.88
May-05		61.7	9.54
Jun-05		55.7	12.88
Jul-05		41.7	9.36
Aug-05		49.4	15.04
Sep-05		41.0	8.31
Oct-05		42.4	6.79
Nov-05		14.4	6.51
Dec-05		42.3	11.94
Jan-06		26.6	6.19
Feb-06		37.2	8.28
Mar-06		26.4	9.29
Apr-06		17.3	4.34
May-06		27.6	7.08

Jun-06	54.1	13.07
Jul-06	13.0	9.93
Aug-06	36.0	8.42
Sep-06	32.0	6.90
Oct-06	28.8	5.49
Nov-06	32.2	6.26
Dec-06	30.0	7.05
Jan-07	17.2	3.58
Feb-07	49.0	7.40
Mar-07	67.5	11.54
Apr-07	39.0	9.28
May-07	29.2	8.86
Jun-07	49.5	12.12
Jul-07	23.7	6.04
Aug-07	30.5	8.93
Sep-07	33.2	8.88
Oct-07	42.2	7.07
Nov-07	38.9	6.35
n =	52	52
Average	35.7	7.30
Standard Deviation	12.82	2.75
Coefficient of Variation (CV)	0.36	0.38
Weekly - LTA Multiplier *	2.12	2.26
Average - LTA Multiplier **	1.49	1.54
	TN	TP
Average Weekly Limit (AWL), lb/day	75.8	16.5
Monthly Average Limit (AML), lb/day	53.3	11.2
* Source: EPA, 1994, TSD, Table 5.2, AWL 99 th Percentile ** Source: EPA, 1994, TSD, Table 5.2, AML 99 th Percentile, n=4		